DOCUMENT RESUME

ED 448 698 IR 020 461

AUTHOR Bhattacharya, Madhumita
TITLE A Study of Asynchronous and Synchronous Discussion on Cognitive Maps in a Distributed Learning Environment.
PUB DATE 1999-10-00
NOTE 7p.; In: WebNet 99 World Conference on the WWW and Internet Proceedings (Honolulu, Hawaii, October 24-30, 1999); see IR 020 454.
PUB TYPE Reports - Research (143) -- Speeches/Meeting Papers (150)
EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Cognitive Mapping; Comparative Analysis; *Computer Mediated Communication; Cooperative Learning; Distance Education; Foreign Countries; *Group Discussion; Listservs; Postsecondary Education; Student Attitudes; Student Surveys; World Wide Web
IDENTIFIERS Chat Rooms; Learning Environments

ABSTRACT

This paper reports on a comparative study of the use of asynchronous (bulletin board) and synchronous (chat) discussion on three learning units based on the cognitive maps developed by the learners. Cognitive maps have been found to be an effective tool for learners for discussion in a distributed learning environment. Cognitive maps provided learners a way to organize their understanding of the learning units. Participants in the study were 15 professionals, mostly engineers, from different organizations from around the world. During the discussion session on the Internet, the learners were able to exchange their ideas based on the cognitive maps. After the discussion, learners modified their cognitive maps with regard to newer understanding of the text. The learners preferred the bulletin board as a discussion platform as it gave them a better opportunity to concretize their thoughts before responding to the collaborating group members. (Contains 10 references.) (Author/MES)

Reproductions supplied by EDRS are the best that can be made
from the original document.

ED 448 698

A Study of Asynchronous and Synchronous Discussion on Cognitive Maps in a Distributed Learning Environment

Madhumita Bhattacharya
National Institute of Multimedia Education, Japan
Email: mita@nime.ac.jp

G.H. Marks

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
This document has been reproduced as received from the person or organization originating it.
Minor changes have been made to improve reproduction quality.
Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

Abstract: A comparative study of use of asynchronous (bulletin board) and synchronous (chat) for discussion on three learning units based on the cognitive maps developed by the learners has been made. We have found that cognitive maps could be an effective tool for learners for discussion in a distributed learning environment. Cognitive maps provided learners to organize their understanding of the learning units. During the discussion session on the Internet the learners were able to exchange their ideas based on the cognitive maps. After the discussion learners modified their cognitive maps with regard to newer understanding of the text. The learners have preferred bulletin board as a discussion platform as it gave them better opportunity to concretize their thought before responding to the collaborating group members.

1. Introduction

There is a strong movement in education today toward a learner-centered model where the learning activities involve students in inquiry and problem solving, typically in a collaborative framework [Duffy, Dueber & Hawley 1997]. We are confident that a highly interactive, learner-centered environment is a worthy goal in higher education and training environment in terms of quality of the learning experience [Austin 1993; Johnson & Johnson 1993]. Interaction is valued as a vehicle for developing metacognitive, critical thinking and reflective thinking skills. In one of his recent publications David Jonassen [Jonassen 1996] explores collaboration as a function of knowledge construction.

Problem based learning (PBL) is perhaps the most widely applied approach to teaching in which the focus of learners' activity is collaborative inquiry and the teacher is a facilitator. We are presently involved in the development of a WWW based system for PBL [Madhumita & Akahori 1998]. We plan to implement bulletin board for on-line and off-line discussion among the members of a group. We also intend to introduce development of cognitive maps by individuals based on their understanding of various concepts and their relations during the self-study. Cognitive mapping is a process for representing concepts and their relationships in graphical form, providing teachers and students with a visually reach way to organize and communicate what they know. Use of cognitive maps during discussion sessions helps in focussing the discussion.

Cognitive maps or concept maps provide a flexible format for graphic representation of concepts and the relationships among them [Jonassen, Beissner & Yacci 1993; Novak & Gowin 1984]. Cognitive maps are hierarchical representations of concepts and propositions that reflect both the content and the structure of a person's knowledge in a given domain. We know that the knowledge content and structure may be different for different people (or change over time for the same person), cognitive maps may help us communicate with each other about what we know or think we know. Visual organizers, in general, can be defined as graphic representations of different kinds of thinking processes [Clarke 1991]. Cognitive maps are a form of visual organizer that, as Clarke has pointed out, supports both inductive and deductive thinking.

In the present experiments the learners summarized the given text material in the form of cognitive maps. In the process of summarization learners must read and understand new information and then transform that information in the form of a cognitive map. Cognitive mappings have been used as a visual organizing technique and were used as a tool for discussion.

IR020461

BEST COPY AVAILABLE

2. The Study

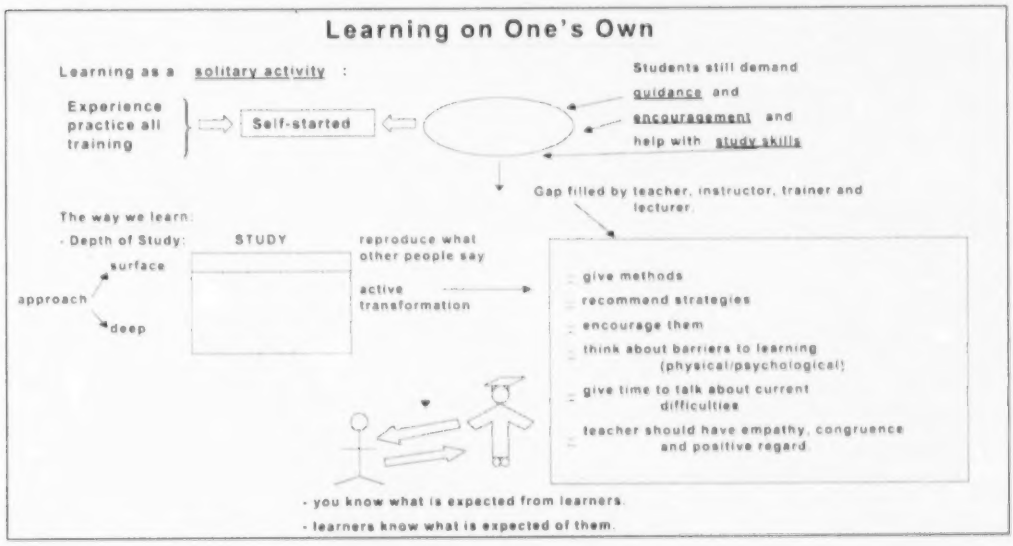
The present experiment consists of three steps: 1. Construction of an initial cognitive map based on ones own understanding of the given text material and his/her previous knowledge regarding the concepts in the text, 2. Holding the discussion session using bulletin board and chat facilities over the Internet with the other group members and the teacher and 3. Refining the cognitive maps based on the newer understanding of the concepts.

Fifteen members from different organizations and institutions from different parts of the world have participated in the experiments. Most of the participants were professionals, mostly engineers, therefore, their background knowledge about different aspect of " The Theory of Learning" were same. The three articles chosen for the experiments were: Motivation and Goal Clarity, Learning on One's Own and The Role of Language in Learning. The subjects were suppose to read the given text material on "The Theory of Learning " [Cotton 1995], understand it and develop a cognitive map based on their understanding of the text. The cognitive maps were conceived and produced first on paper and then they were converted into Word or Power Point files. After completion of the individual cognitive maps these maps were sent to the author by fax or as email attachment. These cognitive maps were then delivered to each member of a group half an hour before the discussion session by using fax, as email attachment or as URL.

The subjects participated in the discussion session through the World Wide Web. There were six groups having three and two members using bulletin board and Internet chat respectively. One article was assigned to five participants where three of them discussed their cognitive maps using bulletin board and two used chat. In the discussion session subjects used nicknames in order to keep their original identity hidden such as name, sex and nationality.

The author (nickname: Mita) participated as the moderator in the discussion session. The cognitive maps were considered one by one for discussion in each group. Subjects were asked to explain certain features of their maps. The subjects concentrated on every aspect of a map. They discussed about the individual opinion of the collaborating partners on the given text material.

On an average discussion session lasted for one hour. The discussion took place by using Internet chat and bulletin board developed by the author. Excerpts from the discussion sessions using two different ways have been placed in figure 1 and 2. In order to make the discussions understandable, the cognitive maps produced by Celia and Sakura are given before [Fig. 1] and [Fig. 2] respectively.

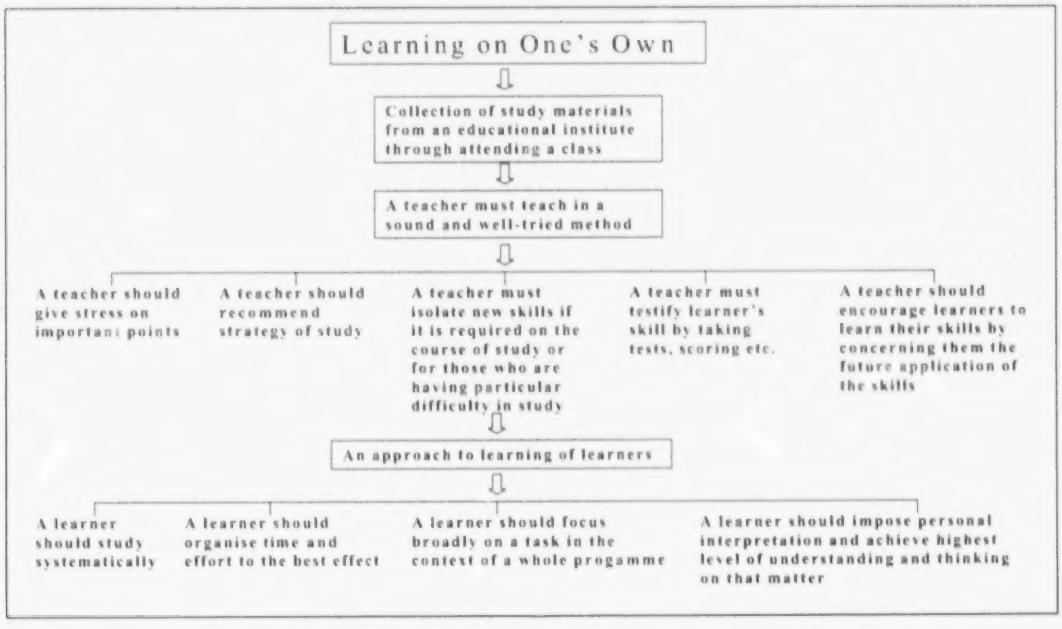


Celia's Cognitive Map: Learning on One's Own

BEST COPY AVAILABLE

***Ruth**: while the article's title is learning on one's own, I think the author really didn' suggest any tips or ways to study on one's own.*
mita: I am thinking about the Celia's map I would like to ask on what she meant by two different human figure
mita: celia do you agree with ruth that the article does not give any tips on learning on your own
Celia: about the figures, one is the leaner and the other the teacher, there is an inter-relation, a feed back between
***Ruth**: For e.g., even in his tips to the instructors he says that either friends or groups are needed to learn . Recall "learning-to-learn work shop" in the text*
mita: Actually this text is for teachers who should prepare the students for learning on their own this is my observation
***Ruth**: Mita! I think you are correct*
Celia: One question, do you think these guidelines can be applied in learning at any level? I mean, university, high school, primary school?
mita: Celia in your fig. active transformation and gap filled by teacher etc the arrows pointing to the same box could you through some light on the same
mita: According to me this guidelines could be applied definitely in high school and higher education and with little modifications in primary education
mita: the last two sentences in your diagram convey something
***Ruth**: I thought these guide lines would be useful at higher levels, I mean in college or universities rather at primary and high school level*
mita: yes definitely these are very useful for adult learners
mita: Celia some thing about last two sentences please
Celia: active transformation I think it is talking about the Piagetian words about assimilation and accommodation, what is necessary for learning from the learner and the square is indicating what the teacher can do, then it comes the relation between then. The two lines at the end are pointing that learning by one's own is not a solitary activity, it can't be so.

Figure 1: Excerpts from Discussion Session (using chat)


Learning on One's Own
Collection of study materials from an educational institute through attending a class
A teacher must teach in a sound and well-tried method
A teacher should give stress on important points
A teacher should recommend strategy of study
A teacher must isolate new skills if it is required on the course of study or for those who are having particular difficulty in study
A teacher must testify learner's skill by taking tests, scoring etc.
A teacher should encourage learners to learn their skills by concerning them the future application of the skills
An approach to learning of learners
A learner should study systematically
A learner should organise time and effort to the best effect
A learner should focus broadly on a task in the context of a whole progamme
A learner should impose personal interpretation and achieve highest level of understanding and thinking on that matter

Sakura's Cognitive Map: Learning on One's Own

BEST COPY AVAILABLE

Hi members!
I must congratulate Sakura for making a lively pictorial presentation for the concept map.
I would like to make the following comments.
M1 I think after the 1st block one block should come. This block should tell the aim and objective because the learner should know what to study and to which extent(i.e., whether surface or deep approach in a time frame manner).
M2 The 3rd block should be little changed. Since this is a topic for Learning on One's own, the teacher need not to spoon-feed. Teacher should help only when the student request him/her to do so i.e. they need some guidance.
Merry

Hi Merry
your 1st comment on objectives is really valid because otherwise students are confused. Sakura has logged in she will contact soon. I am extremely sorry for the delay. I suppose learning on one's own could be successful if the approach is always deep otherwise strategic study is only for scoring marks.
Yes we call pro active (spoon feeding) and reactive (when desired by student) there are two categories. So teacher should be facilatator
Mita

Hi members!
Thank you very much for your clear pictorial view. Here I would like to answer regarding your points, these are as follows:
(1)Yes, the learner must have a particular aim and objective. The approach should not be superficial way, that is why I mentioned highest level of understanding and thinking should be achieved by the learner.
(2)Yes, learning by oneself should not be spoon-fed. But here by the strategy of study, I wanted to mean the proper way of collecting study materials (e.g. compiled brochure for proper library use should be given, important and interesting points on subject should be given to students for clear understanding)
Thank you very much for pointing out for the missing points.
regards,
sakura

Figure 2: Excerpts from Discussion Session (using bulletin board)

Participants using chat found it difficult to respond quickly as they got less time to think before responding. They were feeling some kind of mental pressure to respond immediately and so their responses were not involving much thought. The participants in the chat sessions were unable to gather comments and ideas in order to provide quick response. Therefore, the mental stress was accumulating.

After the discussions the participants modified their cognitive maps based on the newer understanding of the concepts particularly they modified the links among various concepts and added the missing concepts and links. An example of a before discussion cognitive map and after discussion cognitive maps are given in [Fig. 3] and [Fig. 4] respectively produced by the participant (nickname:Yang.)

At the end of the experiment the participants responded to a questionnaire. The responses to the questionnaire revealed that the participants liked the use of cognitive maps for discussion. They were able to focus and think critically with the help of the cognitive maps. Participants preferred the use of bulletin board as compared to Internet chat. They found that the quality of discussions are not very good in case of chat as participants hardly got time to think critically in order to respond.

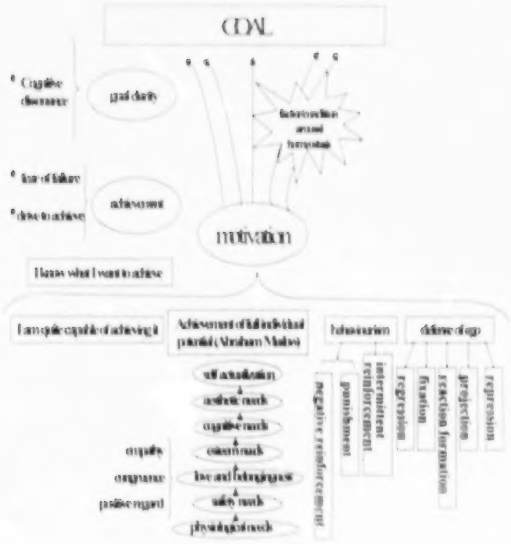


Figure 3: Before Discussion Cognitive Map (based only on Self-Study)

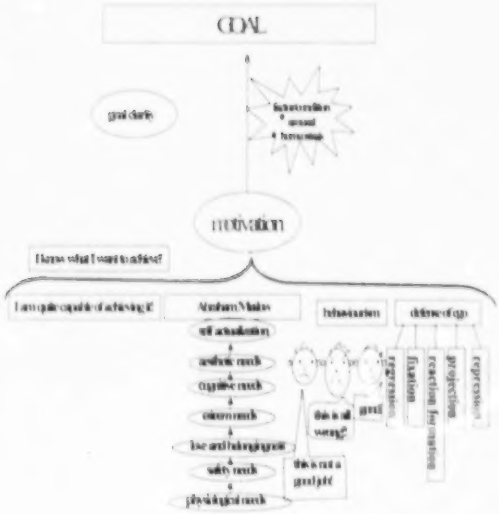


Figure 4: After Discussion Cognitive Map (modified based on the discission)

3. Discussion

In the exercise all the participants produced the cognitive maps based on their understanding of the given text material before the discussion session and all of them modified the maps after the discussion. All the subjects participated sincerely in the discussion. Some of the participants were reluctant to label relationships among ideas in their maps, and the first effort of these participants tended to present very less information regarding connection between concepts or ideas.

These differences in the cognitive maps may be explained by the amount of effort that participants put into their maps. As Corno and Mandinach's theory of self regulated learning suggests, learners adapt the level of effort and the ways in which they acquire (attending, rehearsing, monitoring, strategic planning) and transform (selecting, connecting, tactical planning) information to the situation [Corno & Mandinach 1983].

In the most involved mode of learning, comprehensive engagement, learners use all the learning processes and skills optimally. When learners are focused on a task, they emphasize transformation processes of selecting important information, connecting new information to already known, and making tactical plans to achieve the task. When learners are presented with situations that either encourage or force them to manage their resources, they expend effort in finding ways to avoid all or part of the effort (such as working with others to share work). When learners are in a passive position, such as a lecture situation, they receive information and avoid transforming processes. Therefore in this study participants modified their maps after the discussion session because sharing ideas made them identify the missing links and fill the gaps between ideas and concepts, reduce verbatim, etc. The modified maps were more complete. Cognitive mapping as a information manipulation strategy enhanced students' abilities to understand complex materials.

The asynchronous environment affords learners the time for thoughtful analysis, reflection, and composition as discussion of an issue evolves. Furthermore, the discussions are products that the teacher can review and grade and on which he/she can give feedback.

BEST COPY AVAILABLE

4. Conclusions

The individual cognitive maps produced after self-study could be a useful tool for discussion in a distributed learning situation. The learners could understand the text more thoroughly after the discussion session and modified their maps accordingly. Therefore, in this way cognitive mapping could be an effective organizing tactic in metacognitive and reflective thinking learning strategies.

Discussion in a distributed learning environment offers the potential for realizing the intellectual goals in higher education; to move beyond transmitting information and testing for facts and procedures. Issue-based or focused discussions provide opportunities for modeling of higher-order thinking skills and collaborating members provided cognitive scaffolding. As compared to synchronous discussion asynchronous discussion affords the opportunity for learners to engage in critical thinking. Database of asynchronous discussion affords the teacher to assess learners based on the quality of their thinking.

5. References

[Austin 1993] Austin, A. (1993). What matters in college. San Francisco, CA. Jossey-Bass Publishers.

[Clarke 1991] Clarke, J. H. (1991). Using visual organizers to focus on thinking. Journal of Reading, 34(7), 526-534.

[Corno & Mandinach 1983] Corno, L., & Mandinach, E. B. (1983). The role of cognitive engagement in classroom learning and motivation. Educational Psychologist, 18(2), 88-108.

[Cotton 1995] Cotton, J. (1995). The Theory of Learning, London, Kogan Page.

[Duffy, Dueber & Hawley 1998] Duffy, T. M., Dueber, W., & Hawley, C. L. (1998) Critical thinking in a distributed environment: A pedagogical base for the design of conferencing systems. In C. J. Bonk & K. King (eds.) Electronic collaborators: Researching the discourse of learner-centered technologies.

[Johnson & Johnson 1993] Johnson, D. & Johnson, R. (1993). What we know about cooperative learning at the college level. Cooperative Learning, 13(3), 17-23.

[Jonassen 1996] Jonassen, D. H., (1996). Computers in the Classroom: Mindtools for Critical Thinking, Englewood Cliffs, NJ: Printice-Hall Inc.

[Jonassen, Bessner & Yacci 1993] Jonassen, D.H., Bessner, K., & Yacci, M. (1993). Structural knowledge: Techniques for representing, conveying, and acquiring structural knowledge. Hillsdale NJ: Erlbaum.

[Madhumita & Akahori 1998] Madhumita & Akahori, K. (1998) Pedagogical principles in the design and development of a Internet based system of problem based learning. Proceedings of ICCE'98, vol.2, 115-119.

[Novak & Gowin 1984] Novak, J. D. & Gowin, D. B. (1984). Learning how to learn. Cambridge: Camgridge University Press.

Acknowledgements

The author wishes to thank all the participants of this experiment without their sincere help this work would not have been possible. This work has been conducted at the previous institution of the author, i.e., the Center for Research and Development of Educational Technology, Tokyo Institute of Technology, Tokyo, Japan in March, 1999 under the postdoctoral research fellowship grant from Japan Society for the Promotion of Science.